

REMARKS

Claims 1, 3, 5, 13 and 14 are presented for examination. Claims 6-12 are withdrawn from consideration. Claims 2 and 4 are cancelled without prejudice or disclaimer. Claim 1 has been amended. Claims 13 and 14 have been added.

The Examiner's assistance in prosecuting the present application during the June 24, 2004 Examiner's Interview is greatly appreciated.

Claims 1, 3 and 5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Makino et al. in view of the Krauss et al. publication.

During the Examiner's Interview, the Examiner suggested that claim 1 should be amended to recite that the filter element is provided directly on the substrate to make clear that the filter element is provided on the same substrate with the amplifier element and the harmonic processing circuit. Such amendment would clearly define the claimed language over the structure shown in FIG. 7 of Makino, where isolator 1 including impedance conversion circuit 6 (considered by the Examiner to correspond to the claimed filter element) is provided in a separate block connected to circuit board 51.

Claim 1 has been amended per the Examiner's suggestion. Claim 1, as amended, recites a high-frequency amplifier connectable to a non-reciprocal circuit element having an input impedance lower than an output impedance. The amplifier comprises:

- a substrate;
- an amplifier element provided on said substrate for receiving and amplifying an input signal;
- a harmonic processing circuit provided on said substrate for providing a proper output load of harmonics included in an output signal from said amplifier element to improve an efficiency of said amplifier element; and

- a filter element provided directly on said substrate to receive an output from said harmonic processing circuit for selectively passing a signal to be supplied to said non-reciprocal circuit element by using a predetermined frequency as a cutoff frequency.

It is noted that the limitation related to the structure of the filter element is deleted from claim 1 because the claim, as amended, is clearly defined over the prior art without this limitation.

Newly added claim 13 dependent from claim 1 recites the limitation deleted from claim 1. This claim specifies that first and second via holes are formed in said substrate for connection of a front side of said substrate with a ground electrode provided on a rear side of said substrate, said high-frequency amplifier further comprises said ground electrode, and said filter element includes:

- a first signal line provided on said substrate to extend from an output of said harmonic processing circuit to said non-reciprocal circuit element;
- an inductor arranged on said first signal line;
- a second signal line provided on said first signal line to extend from a first node on an input side of said inductor to said ground electrode via said first via hole;
- a first capacitor provided on said second signal line on said substrate;
- a third signal line provided on said first signal line to extend from a second node on an output side of said inductor to said ground electrode via said second via hole; and

- a second capacitor provided on said third signal line on said substrate.

In the previous response, the applicant submitted that neither Makino nor Krauss teaches or suggests:

- the claimed second signal line provided on the first signal line to extend from a first node on an input side of the inductor to the ground electrode via the first via hole,
- the claimed third signal line provided on the first signal line to extend from a second node on an output side of the inductor to the ground electrode via the second via hole, and
- the respective capacitors provided on the second and third signal lines.

In response to Applicant's arguments, the Examiner relies upon the Maruhashi et al. patent as "evidence which teaches providing ground connections for electrodes on the top of a substrate by means of vias connecting to a bottom ground plane (e.g., Fig. 2)."

Based on this reference, the Examiner concludes that "it would have been obvious to have made the Makino connections of the capacitors (C) of the two signal lines that are connected to ground (e.g., see Fig. 1)."

It is respectfully submitted that the Examiner's position of obviousness is improper. First, Maruhashi et al. is not applied in the present rejection under 35 U.S.C. § 103, and the Examiner provides no reason why one having ordinary skill in the art would have been led to modify Makino in view of Maruhashi to arrive at the claimed invention.

It is well settled that in the application of a rejection under 35 U.S.C. §103, it is incumbent upon the Examiner to factually support a conclusion of obviousness. In particular, the Examiner must provide a reason why one having ordinary skill in the art

would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 227 USPQ 657 (Fed. Cir. 1985). *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); *In re Warner*, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967).

These showings by the Examiner are an essential part of complying with the burden of presenting a *prima facie* case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). The Examiner has failed to provide the requisite reasons for modifying Makino in view of Maruhashi, and thus to establish a *prima facie* case of obviousness.

Second, even if these references were combined, the claimed invention would not result because the combination of Makino with Maruhashi does not suggest:

- providing the second signal line on the first signal line to extend from a first node on an input side of the inductor to the ground electrode via the first via hole,
- providing the third signal line on the first signal line to extend from a second node on an output side of the inductor to the ground electrode via the second via hole, and
- providing the respective capacitors on the second and third signal lines.

As discussed in the present application on page 16, line 29 to page 17, line 12, the claimed arrangement of the filter reduces parasitic inductive components of the capacitors to improve efficiency of the amplifier and reduce distortion.

Hence, a conclusion of obviousness with respect to the subject matter of claim 13 is unwarranted.

Newly added independent claim 14 recites an amplifier module connectable to a non-reciprocal circuit element having an input impedance lower than an output impedance.

The amplifier module comprises:

- an input terminal for receiving an input signal,
- an output terminal for providing connection to said non-reciprocal circuit element,
- an amplifier element responsive to the input signal for producing an amplified signal,
- a harmonic processing circuit responsive to the amplified signal for providing a proper output load of harmonics included in the amplified signal to improve an efficiency of said amplifier element, and
- a filter element provided between the harmonic processing circuit and the output terminal of the amplifier module for performing frequency filtering of a signal produced by said harmonic processing circuit in order to pass to the output terminal an output signal in a predetermined range of frequencies.

It is respectfully submitted that the prior art of record does not teach or suggest the claimed filter element provided in an amplifier module between the harmonic processing circuit and the output terminal of the amplified module for passing to the output terminal a filtered signal in a predetermined range of frequencies.

As discussed in the present application on page 4, line 27 to page 5, line 16, the prior art structure shown in FIG. 16 of the application has a low-pass filter 113 provided in a low-impedance isolator 103, i.e. in a non-reciprocal circuit element connected to an amplifier 101 through a low-impedance transmission line 102. The input impedance of the isolator

103 changes with a frequency. A variation of the impedance over a frequency range may be expressed as:

$$\sqrt{1 + 2\pi L(f_l - f_h)^2},$$

where L is the inductance of the transmission line 102, and f_l and f_h are the lowest and the highest frequency in the frequency range.

When the inductance L increases, the impedance variation also increases. Hence, efficiency of amplification is deteriorated because the input impedance of the isolator 103 substantially varies with respect to the output impedance of the amplifier 101.

As described in the present application on page 14, lines 1-9, when a filter element, for example, a low-pass filter 1 is connected between the output of the harmonic processing circuit and the output terminal of the amplifier module, the impedance variation due to the inductance L of the transmission line 102 is eliminated. Therefore, a higher efficiency of the amplifier may be obtained.

It is noted that similarly to the prior art arrangement shown in FIG. 16, the Makino patent cited in the previous Office Action suggests providing a filter element (impedance conversion circuit 6) in the isolator 1 (see FIGS 1-6, and col. 4, lines 29-31, 46-51).

The other references of record also do not teach or suggest the claimed filter element provided in an amplifier module between the harmonic processing circuit and the output terminal of the amplified module for passing to the output terminal a filtered signal in a predetermined range of frequencies.

Moreover, the prior art of record does not teach or suggest the claimed harmonic processing circuit provided in the amplifier module.

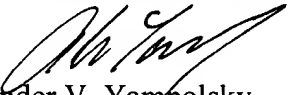
Hence, the subject matter of claim 14 is clearly defined over the prior art of record.

In view of the foregoing, and in summary, claims 1, 3, 5, 13 and 14 are considered to be in condition for allowance. Favorable reconsideration of this application, as amended, is respectfully requested.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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